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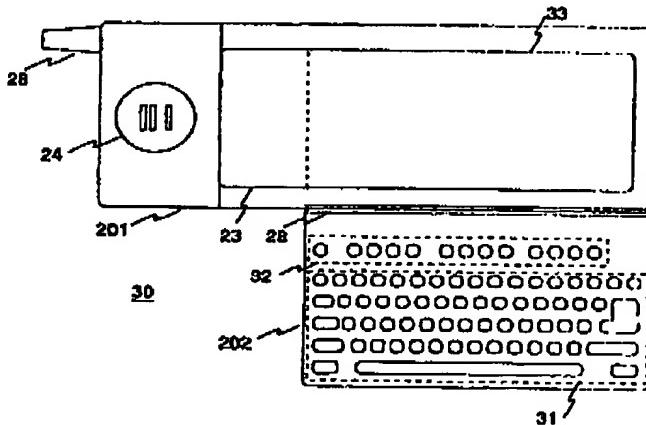
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(71) Applicant (for all designated States except US): MEDSYSTEAMS OY [FI/FI]; Nuottakunnantie 18 D, FIN-02230 Espoo (FI).		
(72) Inventor; and (73) Inventor/Applicant (for US only): KUPIAINEN, Juhani [FI/FI]; Nuottakunnantie 18 D, FIN-02230 Espoo (FI).		Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Finnish).

(54) Title: TERMINAL EQUIPMENT



(57) Abstract

The objective of the invention is terminal equipment (30) that is used in a communication system. The terminal equipment can be, e.g., a mobile station or fixed terminal equipment. According to the invention, the terminal equipment comprises first input means and first display means (23), which are used in the first functional mode, and second input means (31, 32) and second display means (33) that are used in a second functional mode. The terminal equipment has additionally a first part (201) and a second part (202), which can be moved relative to each other. The first input means and display means (23) and the second input means (31, 32) and display means (33) are situated in the first part (201) and the second part (202) in the following way: In the first functional mode, the user surface of the terminal equipment comprises the first input means and the first display means (23) and in the second functional mode the user surface of the terminal equipment comprises the second input means (31, 32) and the second display means (33). With the solution according to the invention, there is an optimized user interface available for both speech transfer connections and text/data transfer connections.

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TERMINAL EQUIPMENT

The objective of the invention is a terminal equipment and especially its user interface as well as a method for the input and display of information in a terminal equipment. The terminal equipment means in this context any terminal equipment that can be connected to a communication system such as a mobile station that can be connected to a cellular system. It may also mean a terminal equipment that is connectable to a fixed network, such as a telephone set. A connection to a communication system means here a wired connection or wireless connection such as a connection that is achieved by a radio interface.

A mobile phone and a fixed network telephone have previously been used mainly for transferring speech, but nowadays the terminal equipment of the communication systems are used more and more also for transferring and processing data such as character data. Additionally the terminal equipment can be used for controlling service functions that are offered by the communication system. These more developed functions set special requirements on the user interface of the terminal equipment.

Figure 1 shows a prior known mobile phone. The user interface of a mobile station 10 usually comprises a numeric keypad 11, function keypad 12 and a display 13. The numeric keypad comprises number keys (0-9), which are used for inputting to the mobile station the telephone number, into which a connection is desired. In addition the numeric keypad generally comprises a few symbol keys. The function keypad is used for activating functions of the mobile station or the communication system. Figure 1 also shows an earpiece 14, a microphone 15 and an antenna 16 of the mobile station.

A mobile station 10 is used in e.g. the following way for forming a connection. The station is connected into an active mode with a key of the function keypad 12, after which the mobile station creates a connection to a base station that is further connected to other parts of the mobile network. After this one uses numeric keys 11 of the mobile station for inputting a subscriber code such as a telephone number of the subscriber that one wants to have connection to. The input number is shown on the display 11 of the mobile station in order to check that the number is correctly input. After this one presses a connection key, which activates the mobile station to transmit the subscriber code information to the base station. Then the mobile

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network forms a connection to another terminal equipment that corresponds to the selected subscriber code.

- In addition to ordinary calls it is possible to use a mobile station for transferring also short messages of a text form, telefax messages or data especially in digital cellular systems. The data to be transmitted or received can be processed in the mobile station or in a computer that is connected to the mobile station. Since the mobile station usually has an efficient processor, it is possible to make the input, processing and storing functions of simple text messages in the mobile station. While the mobile stations further develop, they can be used for further information processing in future, and thus they will serve also as computers. The mobile stations will also be used as mass media, in which case public text information such as news is sequentially transferred into the mobile station.
- When transferring text information one should have as much as possible of text shown in the display so that processing even a long text would be easy. However, in the mobile stations of the prior art the amount of text that is fitted into the display is very small, because the main part of the front panel user surface is used for the keypad, earpiece and microphone, and thus the area that remains usable for the display is small. Since only small amounts of text information is suited to the display, it is difficult to go through and process large amounts of information, because the information must be transferred to the display in small parts. Then visualizing the information as a whole is also difficult.
- Transmitting the text information requires a possibility to input letters and special symbols in addition to inputting just numbers. As the mobile stations are made as small as possible, the number of keys are minimized. This is due to the fact that if the number of keys would be large, the size of the key buttons and their mutual distance would be so small that the use of the keypad in an ordinary speech call mode would be difficult. In a speech call mode the mobile station is often used with one hand only, and therefore it should be easy to press the buttons without a danger of activating the nearby buttons by accident. So if the front panel of the mobile station would be equipped with a button for each alphabet and number character, the size and distance of the buttons would be so small that using the keypad for ordinary speech calls would be very difficult.

Inputting text is solved in the prior art in such a way that the keys that are reserved for the numerals are also used for inputting letters. For this purpose there are three

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letters marked into each numeric key in addition to the number. Inputting the letters is done in the following way:

- Pressing a specific function key of the mobile station sets the keypad into a mode for inputting letters. After this, when a number/letter key is pressed for the first time, this causes the first letter that is marked on the key button to transfer into the memory an the display of the equipment. If the key is quickly pressed for a second time, the letter in the memory and in the display is changed into the second letter that is marked on the key button. If the key is still quickly pressed for a third time, the letter in the memory and in the display is changed into the third letter that is marked on the key button. If after pressing the key one waits for a predetermined time, the letter shown on the display is determined to be the input letter, and the mobile station starts then to wait for the next letter input. This way it is possible to input any of the letters that are marked on the key button by pressing the key one, two or three times, wherein the time between the pressings must be less than a predetermined time length. After this one has to wait at least the said time before inputting the next letter.
- The prior known solution that was explained above has many disadvantages. Firstly, inputting one letter requires in average pressing a button twice. Secondly, one must wait for at least a predetermined time between inputting two letters. In consequence the writing becomes very slow. Additionally it is not quite easy to estimate the time between the pressings, and therefore there may become a lot of mistakes while writing. There is also a problem with this solution that writing both numbers and letters into the text is very difficult, because it requires changing the input mode of the mobile station alternately into numeric input mode and into letter input mode. Additionally it is not at all possible to input special symbols in this solution.
- As was mentioned above, it is possible to use a computer that is connected to the mobile station for processing the texts to be transferred. The user interface of a computer usually comprises a alphanumeric keyboard and a large display. In this case the mobile terminal equipment for transferring speech and data comprises a mobile station and a laptop computer. However, carrying and using this kind of a combination is very troublesome, because the equipment is constructed of two separate devices that are connected with a cable. And the carriable computers are also relatively large and heavy. One has to reserve a lot of table space when using the combination. Additionally starting the programs of the computer requires time.

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- The need of processing text information is increasing also in the fixed terminal equipment. Several services are offered via telephones, where selections are carried out with the keypad of the telephone. However, the numeric keypad is quite restricted as an input means. Additionally there are several services, such as banking services, which would require a large display for showing the received information, such as a statement of account. One prior art solution would be a combination of a telephone and a computer, where the text information would be transferred with the computer, and the telephone is used for a speech connection. However, this would be too large and too expensive equipment in many cases.
- 10 Based on what is explained above one can see that it is not possible with the prior art to implement an easy-to-use and inexpensive terminal equipment for transferring both speech and text/data.
- 15 The purpose of the invention is to create a terminal equipment, which has an easy-to-use user interface and with which it is possible to avoid the described disadvantages of the prior art.
- 20 One idea of the invention is that the terminal equipment according to the invention has two functional modes. The first functional mode is preferably used, when the terminal equipment is used for transferring speech, and the second functional mode is preferably used, when the terminal equipment is used for processing or transferring text information or other data.
- 25 The user interface according to the present invention is preferably performed in such a way that the terminal equipment comprises first display means and second display means, wherein in the first functional mode the information is presented on the first display means and in the second functional mode the information is presented on the second display means. The second display means are preferably larger than the first display means, and the second display means are preferably covered in the first functional mode. As the terminal equipment is then used for transferring speech information in the first functional mode, the whole front surface of the equipment can be used efficiently for the first display and input means that are used in the first functional mode.
- 30 35 The terminal equipment according to the invention has preferably also first input means for inputting information in the first functional mode and second input means for inputting information in the second functional mode. Then the second input

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means are preferably covered in the first functional mode so that the user surface of the equipment can be efficiently used for the first input means and the first display means that are used in the first functional mode.

- 5 Let us note that the input information means here, except information that is transferred between the terminal equipment and the communication system, also e.g. the information that controls the mobile station and communication network and that is input to the mobile station.
- 10 The terminal equipment according to the invention preferably comprises at least two parts that move relative to each other, wherein the parts have a first mutual position in the first functional mode and a second mutual position in the second functional mode. The input means and the display means can then be placed into the parts that are movable relative to each other in such a way that in the first functional mode the user surface of the equipment comprises the first input and display means and in the second functional mode the user surface of the equipment comprises the second input and display means.
- 15
- 20 The terminal equipment according to the invention is characterized in what is presented in the characterizing part of claim(s) 1 and/or 8. The method according to the invention is characterized in what is presented in the characterizing part of claim(s) 24 and/or 25. Preferable embodiments of the invention are presented in the dependent claims.
- 25 The invention is next further explained with the attached drawings, in which
 - figure 1 shows a mobile station according to the prior art,
 - 30 figure 2a shows a front view of a mobile station according to the invention in the first functional mode, where the mobile station has one display unit,
 - figure 2b shows a side view of a mobile station according to the invention in the first functional mode, where the mobile station has one display unit,
 - 35 figure 3a shows a front view of a mobile station according to the invention in the second functional mode, where the mobile station has one display unit,

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figure 3b shows an end view of a mobile station according to the invention in the second functional mode, where the mobile station has one display unit,

5 figure 4a shows a front view of a mobile station according to the invention in the second functional mode, where the mobile station has two display units.

figure 4b shows an end view of a mobile station according to the invention in the second functional mode, where the mobile station has two display units.

10 figure 5 shows a mobile station according to the invention in the first functional mode, where the mobile station has two display units.

figure 6 shows a fixed terminal equipment according to the invention in the first functional mode and

15 figure 7 shows a fixed terminal equipment according to the invention in the second functional mode.

20 Figure 2a and figure 2b show a mobile station according to the invention in a first functional mode. In figure 2a the mobile station 20 is shown from the front and in figure 2b the mobile station 20 is shown from the side. The mobile station has two parts, first part 201 and second part 202, which are attached to each other with hinges 28 or some similar attachment means in such a way that the first part and the second part can be moved relative to each other around the attachment means. The edge of the second part 202 is marked 203 in the figure. The second part can be turned around the hinges e.g. 180 degrees relative to the first part. The first part 201 comprises a display 23, earpiece 24 and an antenna 26. The numeric keypad 21, the functional keypad 22 and the microphone 25 are situated in the second part 202. In the first functional mode the mobile station can be used e.g. for forming a connection and for transferring speech as in an ordinary mobile telephone as was described above in the context of describing the prior art.

35 Figure 3a and figure 3b show the mobile station that was presented in figures 2a and 2b in the second functional mode, in which parts 201 and 202 have been turned open relative to each other. In figure 3a the mobile station is shown from the front and in figure 3b the mobile station is shown from the end. In the second functional mode the user interface comprises a alphanumeric keypad 32 and a second display 33. The first display 23 and the second display 33 form in this solution one consistent

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display. In the first functional mode the text information is presented on the display in such a way that the text is in a horizontal position, when the mobile station is in a vertical position. In the second functional mode the text information is in a horizontal position, when the mobile station is in the horizontal position. Thus the 5 characters are presented on the display in two positions that are perpendicular relative to each other, depending on the functional mode. Presenting the information in two different positions makes the reading of the text information easier, because this way the visible part of the display is in a horizontal position in both functional modes.

10 The displays can also be implemented in such a way that, although displays would be constructed of a single display component, the part that functions as the first display is not used in the second functional mode. In this case it is possible for example to attach a transparent protection sheet that in the first functional mode 15 higher the front surface of the display to the level of the surface of the keypad that is used in the first functional mode.

From figures 2a and 3a one can see that when speech connection is used, the mobile 20 station comprises an ordinary user interface, which has large size, easy-to-use numeric keys. On the other hand, when text/data information is transferred, the user interface comprises a large size display and an alphanumeric keypad, which may also have special character keys. Since the size of the mobile phone and thus also the 25 size of the alphanumeric keypad is smaller than the size of ordinary alphanumeric keyboards that are used in computers, it is preferable to use the alphanumeric keypad of the mobile station with a pointer pen.

Figure 4a and figure 4b show another mobile station according to the invention in a second functional mode. Also this mobile station 40 is constructed of two parts, first 30 part 401 and second part 402, which are attached to each other with hinges 48. In the second functional mode the user interface of the mobile station 40 comprises a display 43 in the first part 401 and an alphanumeric keypad 41 and a function keypad 42 in the second part 402.

The mobile station 40 is set to the first functional mode by turning the second part 35 on the first part, which makes the keypads 41 and 42 and the display 43 to become covered. The mobile station in the first functional mode is shown in figure 5. In the first functional mode the first half of the second part forms the front surface of the mobile station. This first half of the second part comprises the user interface means

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of the first functional mode. These user interface means of the first functional mode comprise a numeric keypad 51, selection keypad 52 and a display 53. Additionally figure 5 shows an earpiece 54, a microphone 55, an antenna 56 and hinges 58.

- 5 The keypads 41 and 42 and the display 43 that are used in the second functional mode can also be situated in the equipment in such a way that the keypads 41 and 42 are in the first part 401 and the display 43 is in the second part 402. In this case the equipment is naturally used so that the first part 401 is nearer to the user.
- 10 The mobile station of figures 2a, 2b, 3a and 3b has an advantage that the displays that are used in the first and second functional modes can be realized with a single display, which is partly covered by the second part in the first functional mode.
- 15 The mobile station that is shown in figures 4a, 4b and 5 has an advantage that in the second functional mode both the display and the keypads are as large as possible; they maximally use the front surface of the mobile station.
- 20 If the terminal equipment is not often used for inputting text, the equipment can also be realized without the second keypad. in which case the second display is only used for viewing the incoming messages.
- 25 In the previously presented embodiments the display means can preferably be e.g. an LCD (Liquid Chrystal Display), a fluorescence display or an electroluminiscence display. The second display to be used for processing and transferring text, data etc. has preferably a larger surface area than the first display to be used when transferring speech. Due to the purpose of use the relation of the display surface areas is preferably at least two.
- 30 The input means can be e.g. a keypad that is made of mechanical key buttons, or a membrane keypad. The display and the keypad can also be implemented as a combined touch screen, with which information is input by touching the certain places of the touch screen with a pointer pen. In this case the display shows the areas to be touched and the symbols of the functions that are activated by touching said areas. The touch screen can be implemented as known in the art e.g. with an LCD and transparent resistive membranes that are placed on the display.
- 35

The first part and the second part of the mobile station can be attached to each other, instead of using hinges, also by other attachment means that allow a mutual

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movement. The first part and the second part can also be disconnectable from each other, which makes it possible to place the display part and the keypad part further from each other in the second functional mode. This makes using the equipment easier in the second functional mode, as in inputting text, because the keypad part 5 and the display part can be placed independently from each other to suitable distances from the user.

Transferring signals and operating voltage between the first part and the second part can preferably be made with e.g. flexible flat cable. If the first part and the second 10 part are mechanically disconnectable from each other, the signal transfer can be implemented wirelessly e.g. with infra red data transfer or inductive data transfer. In the infra red data transfer the data to be transferred is modulated into the infra red beam, and in the inductive data transfer the data is modulated into a magnetic field that is created between the parts. If wireless data transfer is used between the first 15 part and the second part, both parts need an own electricity supply such as an accumulator. Since the wireless data transfer generally consumes more energy than a wired data transfer, it is preferable always to use wired data transfer in the first functional mode between the parts. If the first and second parts are separate in the second functional mode, the parts can be connected in the first functional mode so 20 that the parts have connectors, which are connected with each other in the first functional mode. Then in the first functional mode the signals can be transferred between the parts via this pair of connectors.

Additionally a solution is possible, where the first part and the second part are 25 otherwise mechanically separable except that the data transfer between the parts is made with a cable that is connected between the parts. In this case the mutual position of the parts can be changed in the within the mutual distance that is determined by the cable length. Still due to the wired data transfer one can avoid the higher power consumption of the wireless data transfer.

30 Figure 6 presents a fixed terminal equipment according to the invention in the first functional mode. In the first functional mode the user interface of the terminal equipment 60 comprises a first display 63, a numeric keypad 61, a function keypad 62 and a direct call keypad 65. This user interface corresponds to a user interface of 35 an ordinary telephone. The numeric keypad is used for selecting a number, to which a connection is desired, and the function keypad 62 can be used for activating special functions such as an incoming call transfer. The direct call keypad 65 can be used for selecting subscriber numbers that are stored in the memory. The selected

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- phone number and information on the state of the terminal equipment, connection time etc. are shown on the display 53. Additionally the terminal equipment has a handset 64, which is connected to the rest of the terminal equipment with a wire 59. When going into the second functional mode, the second part 602 of the terminal equipment is turned approx. 180 degrees around the hinges 68.

- 5 Figure 7 shows a fixed terminal equipment according to figure 6 in the second functional mode. In the second functional mode the user interface comprises a second display 73, an alphanumeric keypad 71 and a function keypad 72. Also in 10 this embodiment the first display is part of the second display, and thus the displays of the both functional modes can be implemented with one consistent display.

- 15 With the solution according to the invention it is possible to achieve several advantages compared to the prior art. The equipment is small when thinking of carrying and of using it for transferring speech. Thus it is easy to handle the mobile station according to the invention when making a connection, when talking to the mobile station and when carrying the mobile station. In addition the keypad and the display for ordinary mobile phone use can be designed clear. Correspondingly the 20 fixed terminal equipment according to the invention requires little table or other placing surface, and also there the it is possible to design the display and the keypad simple for ordinary speech use.

- 25 For more advanced functions such as processing transmitting and receiving text messages, there is a large sized display available, where a large amount of text is fitted. This way it is easy to read the text, since there is a larger set of text on the display at a time. Secondly, the text input can be made with an ordinary type alphanumeric keypad, a type of which is also used in other text processing equipment and the use of which does not require specific training. This way the text input is faster and the input mistakes remain few. Additionally an ordinary 30 alphanumeric keypad gives a possibility for using special characters and numbers in a text without changing the functional mode between the input of characters. Also the function keys that are characteristic to computer keypads can be included with the alphanumeric keypad.
- 35 If some of the terminal equipment users use the terminal equipment only as a phone, this kind of users only need to learn the simple user interface for the speech use.

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Some applications and embodiments of the method according to the invention have been presented above. Naturally the principle of the invention can be modified within the scope of protection that is determined by the patent claims, e.g. concerning the details of implementation and the areas of use.

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Claims

1. Terminal equipment, which has a first functional mode and a second functional mode and which comprises display means for displaying information, characterized in that said display means comprise first display means (23, 53, 63) for showing information in the first functional mode and second display means (33, 43, 73) for showing information in the second functional mode.
- 5 2. A terminal equipment according to claim 1, characterized in that in the first functional mode said first display means (23, 53, 63) are arranged to show information on functions of the terminal equipment, and in the second functional mode said second display means (33, 43, 73) are arranged to show character information that is transferred between the terminal equipment and the communication system.
- 10 3. A terminal equipment according to claim 2, characterized in that the surface area of said second display means (33, 43, 73) is at least twice as large as the surface area of said first display means.
- 15 4. A terminal equipment according to any of claims 1-3, characterized in that said second display means are arranged to be at least partly covered in said first functional mode.
- 20 5. A terminal equipment according to claim 4, characterized in that it comprises first input means (21, 22, 51, 52, 61, 62, 65) for inputting information to the terminal equipment and said second display means (33, 43, 73) are arranged to be covered in said first functional mode with said first input means, wherein the user surface of the terminal equipment comprises said first input means.
- 25 6. A terminal equipment according to any of the preceding claims, characterized in that said first display means (23, 63) and said second display means (33, 73) form a consistent display.
- 30 7. A terminal equipment according to claim 6, characterized in that said first display means (23, 63) is a part of said second display means (33, 73).
- 35 8. A terminal equipment, which has a first functional mode and a second functional mode and which comprises input means for inputting information and display means

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for displaying information, characterized in that the input means comprise first input means (21, 22, 51, 52, 61, 62, 65) for inputting information in the first functional mode and second input means (31, 32, 41, 42, 71, 72) for inputting information in the second functional mode.

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9. A terminal equipment according to claim 8, characterized in that the first input means comprise a numeric keypad (21, 51, 61) for inputting a subscriber code in the first functional mode and the second input means comprise means (31, 41, 71) for inputting alphanumeric text in the second functional mode.

10

10. A terminal equipment according to any of the preceding claims, characterized in that the user surface of the terminal equipment comprises first input means and first display means in the first functional mode, and the user surface of the terminal equipment comprises second input means and second display means in the second functional mode.

15

11. A terminal equipment according to any of the preceding claims, which comprises a first part (201, 601) and a second part (202, 602) that are movable into a first position and into a second position relative to each other, characterized in that

20 - the first surface of the first part comprises first input means (21, 22, 61, 62) and the first surface of the second part comprises first display means, wherein in the first position the first part and the second part are one on top of another and the user surface of the terminal equipment comprises first input means (21, 22, 61, 62) and first display means (23, 63) and

25 - the second surface of the first part comprises second input means (31, 32, 71, 72) and the first surface of the second part comprises second display means (33, 73), wherein in the second position the user surface of the terminal equipment comprises the second surface of the first part and the first surface of the second part.

30

12. A terminal equipment according to any of the preceding claims, which comprises a first part (401) and a second part (402) that are movable into a first position and into a second position relative to each other, characterized in that

- the first surface of the first part comprises first input means (51, 52) and first display means (53), wherein in the first position the first part and the second part are

35 one on the other and the user surface of the terminal equipment comprises the first surface of the first part and

- in the second position the user surface of the terminal equipment comprises the second surface of the first part (401) and the first surface of the second part (402).

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13. A terminal equipment according to claim 12, characterized in that the second surface of the first part comprises second input means (41, 42) and the first surface of the second part comprises second display means (43).
- 5
14. A terminal equipment according to claim 12, characterized in that the second surface of the first part comprises second display means (43) and the first surface of the second part comprises second input means (41, 42).
- 10 15. A terminal equipment according to any of claims 11-14, characterized in that the first surface and the second surface of the first part are the opposite surfaces of the first part.
- 15 16. A terminal equipment according to any of claims 11-15, characterized in that the first part (201, 401, 601) and the second part (202, 402, 602) are attached to each other from their edges with attachment means (28, 48), and the first part and the second part are turnable relative to said attachment means into a first position and into a second position.
- 20 17. A terminal equipment according to claim 16, characterized in that said attachment means (28, 48) is a hinge.
- 25 18. A terminal equipment according to any of claims 11-17, characterized in that it comprises a flexible wire for transferring signals between the first part and the second part.
- 30 19. A terminal equipment according to any of claims 11-17, characterized in that it comprises a means for wirelessly transferring signals between the first part and the second part.
- 35 20. A terminal equipment according to any of claims 11-19, characterized in that the first part comprises first connector means and the second part comprises second connector means, wherein in the first position the first and second connector means are connected to each other for transferring signals between the first part and the second part.
21. A terminal equipment according to any of the preceding claims, characterized in that the first input means (21, 22, 51, 52, 61, 62, 65) and/or the second input

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means (31, 32, 41, 42, 71, 72) are a keypad and the first display means (23, 53, 63) and/or the second display means (33, 43, 73) are a liquid chrystral display.

22. A terminal equipment according to any of the preceding claims, characterized
5 in that the terminal equipment is a mobile station.

23. A terminal equipment according to any of the preceding claims, characterized
in that it is a terminal equipment that is connectable to a fixed communication
system.

10 24. A method for showing information in a terminal equipment, which has a first
functional mode and a second functional mode, and which terminal equipment
comprises display means for showing information, characterized in that the
information is shown on first display means (23, 53, 63) in the first functional mode
15 and the informaton is shown on second display means (33, 43, 73) in the second
functional mode.

25. A method for showing information in a terminal equipment, which has a first
functional mode and a second functional mode, and which terminal equipment
20 comprises input means for inputting information and display means for showing
information, characterized in that the information is input with first input means
(21, 22, 51, 52, 61, 62, 65) in the first functional mode and the informaton is input
with second input means (31, 32, 41, 42, 71, 72) in the second functional mode.

25 26. A method according to claims 24 and 25, characterized in that the second
display means and/or the second input means are covered in the first functional
mode.

30 27. A method according to any of the claims 24-26, characterized in that the
terminal equipment is used for transferring speech in the first functional mode, and
the terminal equipment is used for transferring text and/or data in the second
functional mode.

35 28. A method according to claim 24, characterized in that the information is shown
in the first functional mode on the first display means in a first position and the
information is shown in the second functional mode on the second display means in
a second position and said first position and second position are substantially
perpendicular relative to each other.

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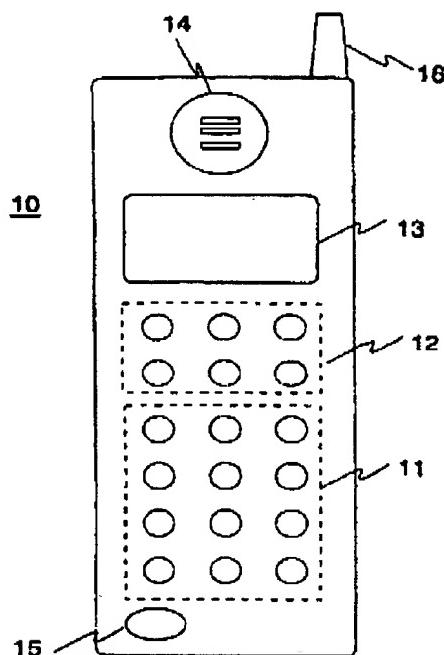


FIG. 1

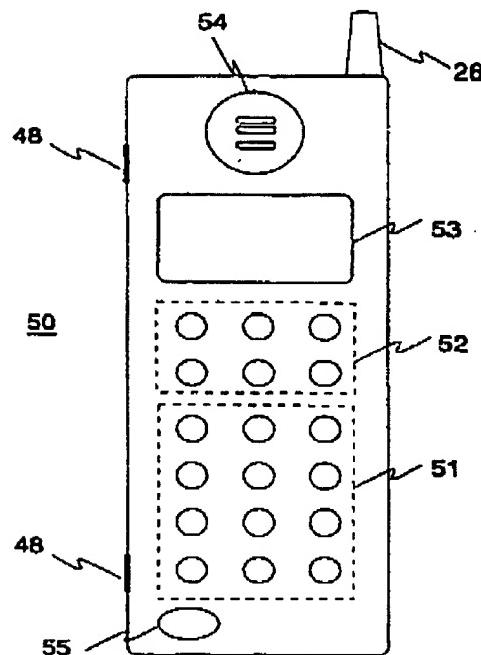


FIG. 5

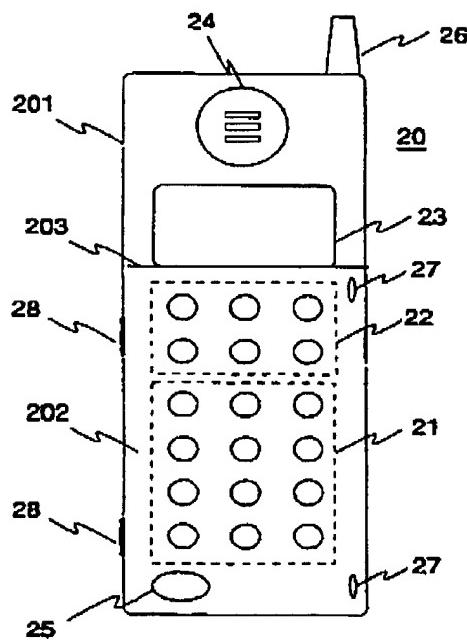


FIG. 2A

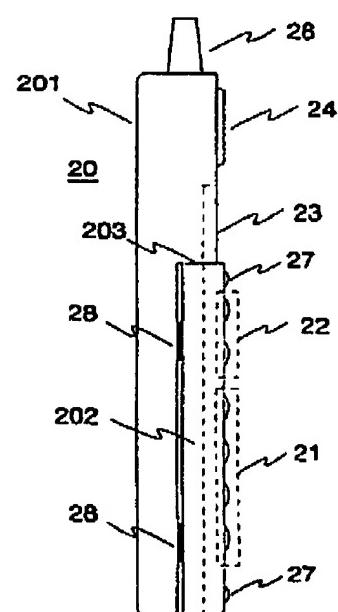


FIG. 2B

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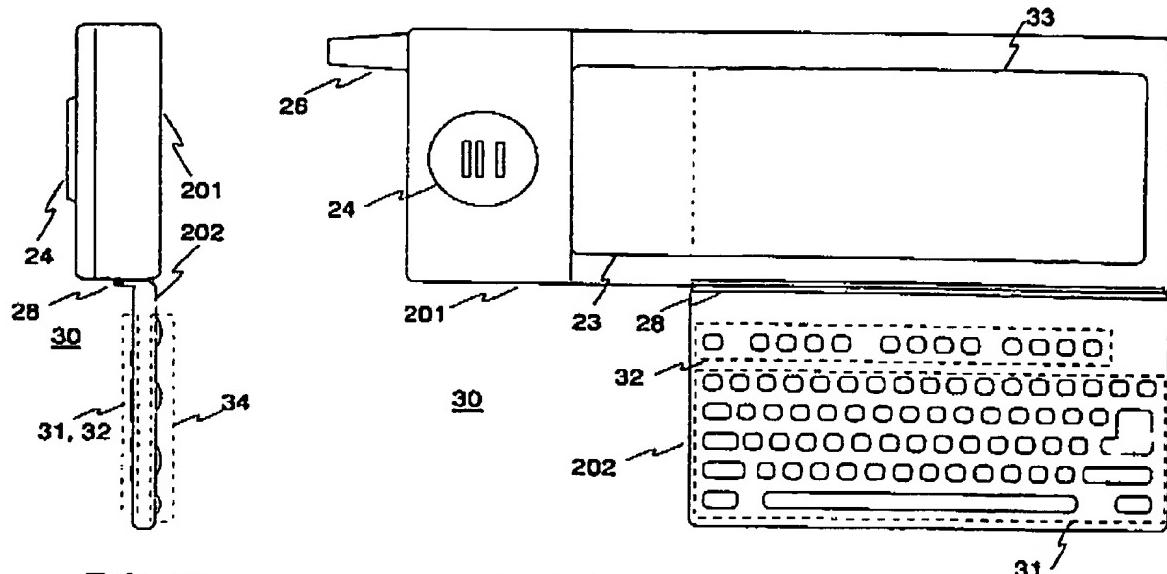


FIG. 3B

FIG. 3A

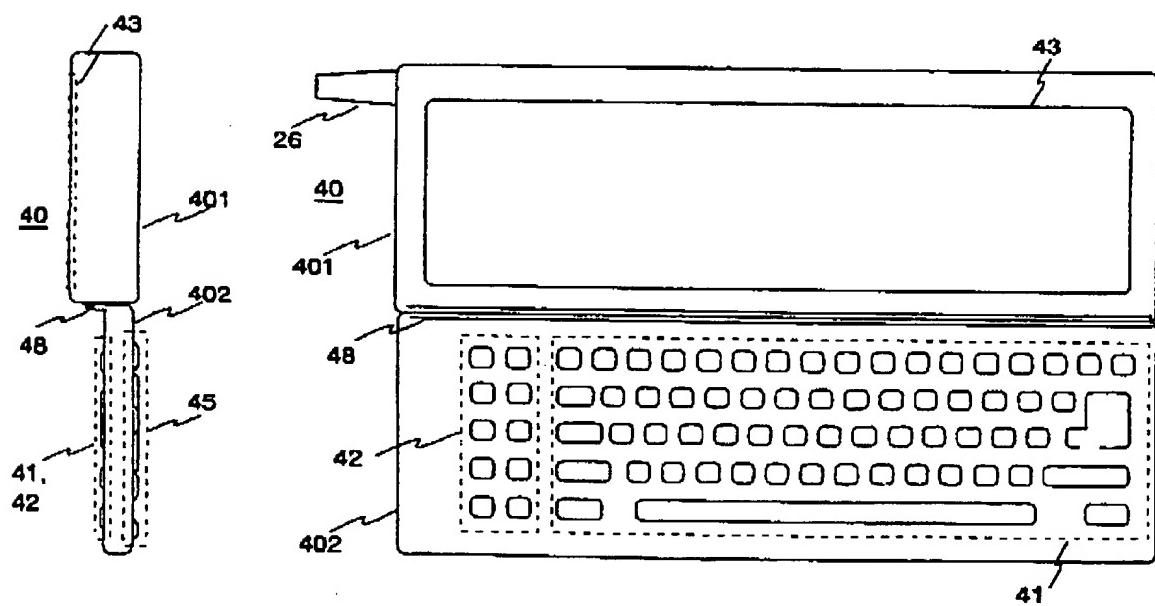


FIG. 4B

FIG. 4A

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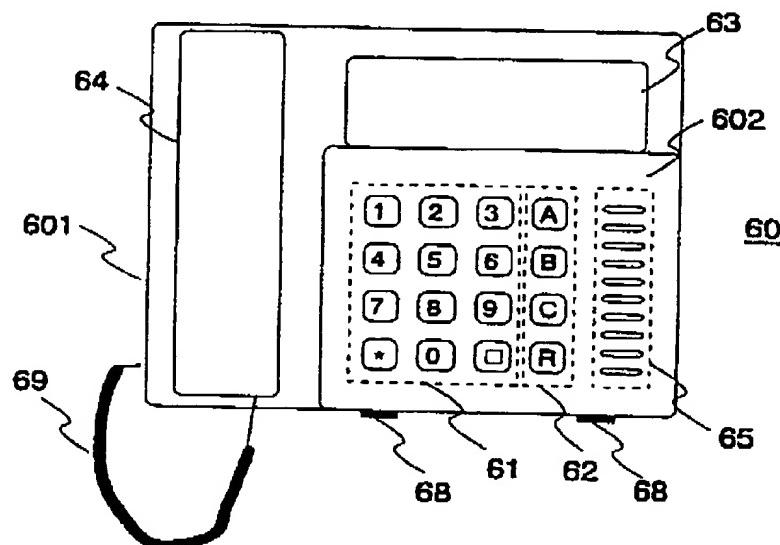


FIG. 6

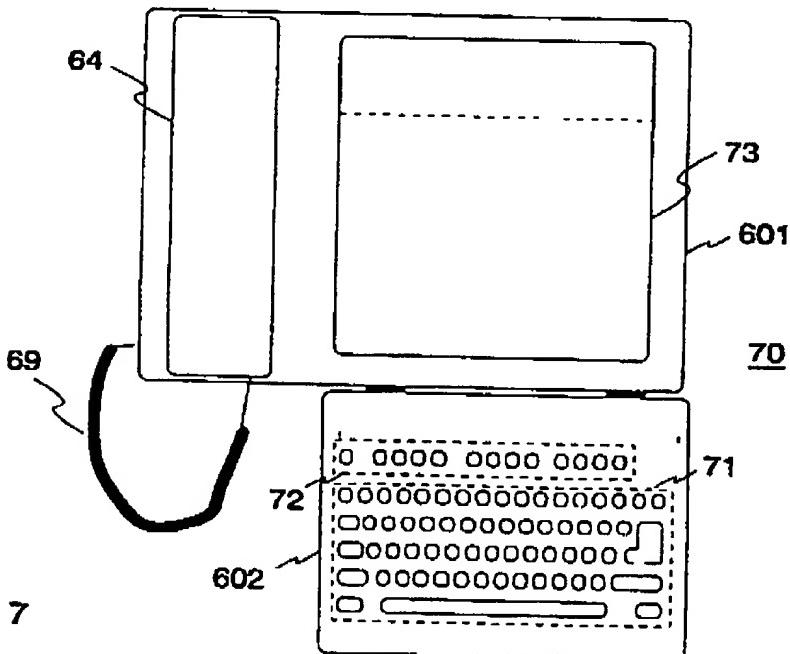


FIG. 7

SUBSTITUTE SHEET (RULE 26)

1
INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 96/00515

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 1/02, H04M 1/72, H04M 11/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5189632 A (PAAJANEN ET AL), 23 February 1993 (23.02.93), column 2, line 1 - column 4, line 3, figures 1-3, abstract --	1-28
X	DE 4108169 C2 (PEIKER, ANDREAS), 22 July 1993 (22.07.93), column 1, line 31 - column 5, line 49, figures 1-7 -- -----	1-28

Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "Z" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 February 1997	24-02-1997
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Roland Landström Telephone No. + 46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI96/00515

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:**

1. **Claims Nos.:**
because they relate to subject matter not required to be searched by this Authority, namely:

2. **Claims Nos.:**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **Claims Nos.:**
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**This International Searching Authority found multiple inventions in this international application, as follows:****see extra sheet**

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI96/00515

- I. Claims 1-7, 10-23
- II. Claims 8-23
- III. Claims 24, 26-28
- IV. Claims 25-27

The search has revealed that all the technical features of independent claims 1, 8, 24 and 25 are known from document US 5 189 632 A, see the whole document. Therefore, the technical features are not special technical features within the meaning of PCT Rule 13.2, second sentence, since they make no contribution over the prior art. Consequently, no technical relationship within the meaning of PCT Rule 13 between the different inventions can be seen.

Therefore, it appears that, a posteriori claims 1-28 do not satisfy the requirement of unity of invention.

INTERNATIONAL SEARCH REPORT
Information on patent family members

03/02/97

International application No.	
PCT/FI 96/00515	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 5189632	23/02/93	DE-D, T- 69118619 EP-A, B- 0472361 SE-T3- 0472361 ES-T- 2085431	05/09/96 26/02/92 01/06/96
DE-C2- 4108169	22/07/93	CH-A- 679963	15/05/92

Form PCT/ISA/210 (patent family annex) (July 1992)

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